Letters to the Editor

The Board of Editors will not hold itself responsible for opinions expressed in the letters published in this section. The notes containing reports of new work communicated for this section should not contain many figures and should not exceed 500 words in length. The contributions must reach the Assistant Editor not later than the 15th of the second month preceding that of the issue in which the paper is to appear. No proof will be sent to the authors.

ABSORPTION OF 8-MILLIMETRE WAVES IN ETHYL BROMIDE

G. P. SRIVASTAVA

INSTITUTE OF APPLIED PHYSICS, UNIVERSITY OF ALLAHABAD, ALLAHABAD, INDIA

(*Received for publication September* 1, 1958)

The absorption of 8 mm electromagnetic waves has been studied in ethyl bromide at various pressures and two temperatures. The technique of measurement has already been reported. Klystron QK292 was used to generate power. Constant temperature chamber was used to maintain temperature. In the present equipment a five foot absorption cell has been used.

The pressure variation of the absorption has been studied and it has been found that pressure absorption curves do not follow exactly the general pattern $\alpha(\nu) \propto p^2$, indicating that study is being made in the region of rotational lines of ethyl bromide.

Table I gives the absorption coefficient values in ethyl bromide at two temperatures.

TABLE I

Absorption coefficient of ethyl bromide at various pressures and two temperatures
Wavelength 8 mm

No.	Temperature °K	Pressure (cm of Hg)	Absorption Coefficient 10^{-4}/cm
1.	283	5	10.6
		10	20.7
		15	25.6
		20	34.2
2.	303	5	7.6
		10	15.8
		15	20.2
		20	28.1

Ethyl bromide is nearly a prolate rotor (K = − 0.98). The constants A, B and C have been determined by Wagner, Solimene and Dailey (1955). The constants for $C_2H_5Br^{79}$ are B = 3804.82 Mc and C = 3522.21 Mc and for $C_2H_5Br^{81}$ are B = 3781.92 Mc and C = 3502.50 Mc. They have observed lines for the transitions $2_{1,2}\rightarrow 3_{1,3}$, $2_{2,1}\rightarrow 3_{2,2}$ and $2_{2,0}\rightarrow 3_{2,1}$.

The absorption observed at 20 cm is very high. The total microwave absorption at a given frequency is the sum of (i) α_1—resonance absorption *i.e.* absorption due to transitions taking place at the frequency of the measurement. (ii) α_2 absorption due to transitions taking place at frequencies (not zero) far removed from the frequency of measurement. (iii) α_3—absorption due to transitions taking place at zero frequency which are broadened by collision (Debye type). Therefore, the absorption observed is the sum of absorption due to Q branch transitions ($\Delta J = +D$) and R branch ($\Delta J = +1$) transitions. The majority of transitions which have high intensity, belong to Q branch and the most of them are at zero wavenumber. It seems that the absorption due to lines at the frequency of measurement (belonging to transitions 4→5) is heavy. Contribution of R branch transitions removed from the frequency of measurement to the absorption is also considerable.

The absorption due to transition at the frequency of measurement is independent of pressure and absorption due to lines removed from the frequency varies as p^2. Therefore, the observed absorption is neither independent of pressure nor, follow the law $\alpha(\nu)\propto p^2$.

As far as the temperature variation is concerned, as the observations are only at two temperatures nothing definite can be said.

Attempt is being made to calculate the absorption theoretically and to determine the value of $\Delta\nu$.

Author is thankful to Prof. Krishnaji under whose supervision the present investigations were made. Author is also thankful to Prof. K. Banerji, Head of the Physics Department, for his interest in the work and the facilities provided.

REFERENCES

Krishnaji and G. P. Srivastava, 1957, *Jour. Sc. & Ind. Res.* (*India*) **16**, 289.
Krishnaji and G. P. Srivastava, 1957, *Phys. Rev.*, **106**, 1186.
Krishnaji and G. P. Srivastava, 1958, *Phys. Rev.*, March 1.
Wagner, R. S., N. Solimene and B. P. Dailey, 1955, *J. Chem. Phys.* **23**, 599.